3.0Identification and Analysis of Removal Action Alternatives

A limited number of removal action alternatives were brought through a screening process to identify viable or appropriate alternatives. Based on the nature and extent of contamination ~~at the site~~ and on the ~~cleanup~~ removal action objectives developed in the previous section, three alternatives are selected for detailed analysis. ~~a limited number of alternatives are identified to address the removal action objectives~~.

3.1 Identification of Potential Removal Action Alternatives

Under CERCLA and NCP it is required that a No Action Alternative be included as a baseline against which to compare the removal action alternatives. However, in this removal action, a No Action Alternative is not an option that will be considered, since removal of the vessel from its current location is one of the removal action objectives and given that the subject of this EE/CA is a vessel. Thus, the only applicable removal action alternatives involve off-site disposal.

Commented [ETL1]: I see no value in including this section. To the extent you want to address doing nothing and off-site disposal, suggest you describe as part of the screening process mentioned above.

Commented [ETL2]: This statement is inaccurate. The no-action alternative applies to only remedial actions.

Commented [R3]: Agree with EL. I do think it's important to state that we are not considering a No Action alternative due to the environmental hazard posed by the vessel Combine the rest of this paragraph with language in 1st paragraph above as intro to this section.

3.2 Identification of Removal Action Alternatives

The following alternatives have been developed for off-site disposal of LST-1166:

- Ocean Disposal with Minimal Abatement
- Ocean Disposal with Full Abatement
- Upland Disposal Greater Portland Area

Commented [ETL4]: How about a different verb such as "limited"?

Commented [ETL5]: Suggest you use decontamination instead of abatement.

Commented [ETL6]: Why limit to Portland, and why characterize as upland disposal ? Suggest something such as "Decontamination, dismantling, and recycling."

These options have been developed to provide a range of options (alternatives) to compare effectiveness, implementation and cost in addressing the removal action objectives. The removal action alternatives were developed to meet the following objectives:

- Remove the vessel from the Columbia River
- Protect human health and the environment by minimizing exposures of hazardous substances on the vessels to humans and the environment
- Eliminate public nuisance
- Other …(based on RAO developed in Section 2)

Commented [ETL7]: This is an inappropriate objective. See § 300.415(b)(1) for when a removal action may be taken.

Commented [ETL8]: This is an inappropriate objective. See § 300.415(b)(1) for when a removal action may be taken.

Commented [ETL9]: Please make sure the RAOs align with § 300.415(b)(2)((i)-(viii).

Commented [R10]: Use 415(b)(1), and 415(b)(2)(i), (ii), and (v) here instead of these other bullets. Cite NCP section above. The language in the current bullets are good, but should be used elsewhere as a preface to what generically we want to do.

Commented [ETL11]: In many ways, this entire section is redundant and could be deleted.

Based on the identification and analysis of the removal action alternative applicable to this site, the alternatives are selected for detailed analysis included in the following sections.

3.2.1 Ocean Disposal With Minimal Abatement

This removal action alternative includes the following actions:

- Pre-removal structural assessment and inspection
- Removal and disposal of approximately 2,000 pounds of solid/hazardous waste
- Removal and disposal of approximately 200 pounds of friable paint chips
- Removal and disposal of approximately 400,000 pounds of foam
- Removal and disposal of 2,500 gallons of oily water
- Removal and treatment of 500,000 gallons of non-oily water

U.S. EPA inspection of the vessel in 2010 indicated the presence of standing water (20 feet deep) in the lower two decks due to a broken seal (U.S. EPA 210a). The water will be pumped out; the seal inspected and repaired to ensure water is removed to the extent practicable. The solid/hazardous wastes removed will be disposed off-~~s~~Site at a permitted treatment, storage and disposal (TSD) facility in accordance with state and federal laws. Lead-based paint and PCB paint removal would not be conducted under this alternative~~.~~; ~~T~~thus, no wastewater from cleaning painted surfaces or wet abrasive blasting will be generated. However, friable and loose paint chips will be removed. The following activities will be carried out to prepare the vessel for disposal.

- Securing equipment on-board the vessel
- Preparation of deck and superstructure
- Preparation of below deck
- Preparation of hull

All loose equipment including engines, generators, cables, winches, girders, boom arms and other assorted machinery will be removed~~, or~~ welded, or otherwise secured to the ship as a part of preparing the vessel for disposal. Some of the equipment may contain residual oils and will be inspected and residual oils removed. The vessel will be then towed ~~using three tugs~~ to a location approximately ~~100~~ 65 nautical miles from the mouth of Columbia River. The vessel will be scuttled to the bottom of the ocean floor at the depth of approximately 1,000 fathoms (over a mile). The location of the disposal will be mapped using GIS. No operation and maintenance is involved with this alternative.

Effectiveness: This alternative will permanently remove the source of contamination from the current location, ~~and~~ eliminate potential exposure routes, and ~~is~~ protect~~ive of~~ public health, the environment and ecology of the Columbia River, and the community. Short-term, there is a potential exposure to the workers preparing the vessel for removal. However, this can be minimized by use of engineering controls and appropriate personal protective equipment. PCB-containing paint, lead-based paint and electrical wiring containing PCBs will remain in place, however, at 1,000 fathoms below the surface of the ocean, there are no human receptors and

Commented [ETL12]: Should also mention BMPs.

Commented [ETL13]: Note whether all decontamination will occur on-Site or whether some must occur off-Site.

Commented [ETL14]: This sentence contradicts the preceding statement that no paint will be removed.

Commented [R15]: Agree with EL, as this is removal of paint, although in limited form. Since this is very important in people's minds, I'd place this sentence first above, before the discussion of the water removal above. Clarify

Commented [ETL16]: Must clarify what each of these activities means.

Commented [ETL17]: Why must machinery be removed from or welded to the ship? What triggers removal v. welding? Identify the final disposition regarding removed machinery (i.e., reuse or recycling).

Commented [R18]: Refer to EPA's Ocean Dumping Program's list of requirements for cleanup of the vessel before a ocean permit

Commented [R19]: Refer to, and have as an attachment the map from USCG showing the disposal/scuttling location.

Commented [ETL20]: Must specify how.

Commented [R21]: Give more info on this – it was first was identified by the USCG in coordination with NOAA. Also, there is a time limit window of opportunity (may until August?) for towing it across the bar at the mouth Columbia River due to weather and sea state.

Commented [ETL22]: The discussion of effectiveness should focus on the factors presented in the NTCRA Guidance. Each factor is deserving of at least two or three sentences of discussion. Go to RI/FS document, spec chapter 6 – see all of these citeria laid out and discussed.

Commented [R23]: Lead in here by stating that NOAA conducted a risk assessment and found that….

impact to any ecological receptors are minimal. At the disposal location, at the bottom of the ocean, the contamination remaining in the vessel will have minimal impact on the environment because the fate and transport of lead and PCBs in paint indicates that these constituent will not likely leach to the environment under the prevailing pressure, temperature and salinity (Yender, 2009).

The US Navy studied several types of solid PCB products to determine the amount of PCBs that leach out of each type of material in a shallow ocean reef setting. The leach rate study found that the PCBs in the electrical cabling are very stable and that only very small amount of PCBs moved out of the cabling and into the surrounding water over the 2 year study. The results showed that bulkhead insulation has the highest leach rate. A complete risk assessment was conducted for two "high risk groups" – scuba divers and angler fishermen and their families. The results of the risk assessment showed the water will be safe for scuba diving and both adults and children can safely eat fish caught at the artificial reef (U.S. Navy, Fact Sheet).

An ecological risk assessment conducted by the Marine Environmental Support Office SPAWAR Systems Center for the Program Executive Office Ships (PEO Ships) for vessel disposal to create shallow artificial reef concluded that total PCB exposure levels predicated by the models showed no indication of risk to plants, invertebrates, fish, sea turtles, and sharks/barracudas that could live, feed, and forage on the reef (PEO Ships, January 2006). The scenario in the study involves sinking a vessel requiring risk-based disposal approval per 40 CFR 761.62(c) for bulk PCBs in solid material at concentrations greater than 50ppm. Based on this study, this alternative will have no impact on any potential receptors and is likely more protective since the vessel will be scuttled at a depth much greater the shallow reef for which the ecological risk assessment was conducted.

Implementability: There are no implementability issues with this alternative as the technical know-how and equipment to conduct the above activities are readily available, and the scuttling technology has a well-established track record. Off-site treatment and disposal facilities are available and there are no impacts to any adjoining properties. There are no administrative issues as no permitting is anticipated.

Cost: The ~~total~~ estimated cost of this alternative is $2,000,000. No O&M cost will be incurred since the balance of what is not disposed of a permitted facility will be sunk at the bottom floor of the ocean.

3.2.2 Ocean Disposal with Full Abatement

Estimated materials currently on board are reportedly above the quantity allowed before a ship can be scuttled per 40 CFR Part 229.2 Transport of Target Vehicles and/or 229.3 Transportation

Commented [ETL24]: This entire discussion should be placed in the risk evaluation section, which should also include an uncertainty analysis,

Commented [ETL25]: The discussion of implementability must address each factor under this criterion; preferably two to three sentences for each factor including technical feasibility, administrative feasibility, and availability of services and materials.

See following comment regarding state and community acceptance.

Commented [ETL26]: This statement is not accurate. Implementability includes state acceptance and community acceptance, and neither will be known until after the public comment period.

These factors are easily addressed by stating something such as "State acceptance nd community acceptance will be determined during the EE/CA public comment and evaluation."

Commented [ETL27]: Organize the discussion of cost to be consistent with the NTCRA guidance (i.e., direct capital costs, indirect capital costs, and annual PRSC costs).

Recommend you bracket the cost estimate (i.e., cost sensitivity) such as ± 15%.

Commented [R28]: From this point down, build out these sections as per EL's comments above, i.e. per the NTSCRA and RI/FA guidance.

Commented [ETL29]: You need not repeat everything from the preceding alternative; rather you could highlight only the differences.

and disposal of vessels (NARA 2010). This removal action alternative includes the following actions:

- Pre-removal structural assessment and inspection
- Removal and disposal of approximately linear …. feet of electrical wiring
- Removal and disposal approximately 2,000 pounds of solid/hazardous waste
- Removal and disposal of lead-based paint from an area measuring approximately 500,00 square feet (ft^2)
- Removal and disposal of PCB paint from an area measuring approximately 12,000 ft^2
- Removal and disposal of approximately 400,000 pounds of foam
- Removal and treatment of 500,000 gallons of non-oily water

U.S. EPA inspection of the vessel in 2010 indicated the presence of standing water (20 feet deep) in the lower two decks due to a broken seal (U.S. EPA 210a). The water will be pumped out; the seal inspected and repaired to ensure water is removed to the extent practicable. The solid/hazardous wastes removed will be disposed off-site at a permitted treatment, storage and disposal (TSD) facilities in accordance with state and federal laws. Lead-based paint and PCB paint removal would generate wastewater from cleaning painted surfaces, wet abrasive blasting, or decontamination of personnel and equipment. Regardless of the source wastewater containing lead and PCB or paint solids will be collected and placed into containers for proper treatment and discharge on location or treatment/disposal at a permitted TSD facility ~~to avoid polluting the river water~~. After the removal is completed confirmation sampling will be conducted to ensure that solid/hazardous materials have been ~~satisfactorily~~ removed. (performance standards) Following ~~EPA approval of the~~ confirmation sampling ~~results~~, the following activities will be carried out to prepare the vessel for disposal.

- Securing equipment on-board the vessel
- Preparation of deck and superstructure
- Preparation of below deck
- Preparation of hull

All loose equipment including engines, generators, cables, winches, girders, boom arms and other assorted machinery will be removed or welded to the ship as a part of preparing the vessel for disposal. Some of the equipment may contain residual oils and will be inspected and residual oils removed. The vessel will be then towed using three tugs to a location approximately ~~100~~ 65 nautical miles from the mouth of Columbia River. The vessel will be scuttled to the bottom of the ocean floor at the depth of approximately 1,000 fathoms (over a mile). The location of the disposal will be mapped using GIS. No operation and maintenance is involved with this alternative.

Effectiveness: This alternative will permanently remove the source of contamination from the current location and eliminate potential exposure routes and is protective of public health and the

Commented [ETL30]: This sentence is prejudicial and should be removed.

Commented [ETL31]: What about reuse nd/or recycling wherever disposal is mentioned?

Commented [ETL32]: What happened to the 2500 gallons of oily water?

Commented [R33]: See previous comment in analogous section above about map reference and attachment

community. Additionally, this alternative removes lead and PCBs in the solid materials on the vessel, thereby minimizing any impact at the disposal location. Short-term, there is a potential exposure to the workers preparing the vessel for removal. However, this can be minimized by use of engineering controls and appropriate personal protective equipment. Residual contamination may remain in place in the water column and sediment, but is not expected to pose short-term or long-term threat to human health and the environment. At the disposal location, at the bottom of the ocean, there are no human receptors that will come into contact with any residual contamination. At the disposal location, the residual contamination remaining in the vessel will have minimal impact on the environment because the fate and transport of lead and PCBs in paint indicates that these constituent will not likely leach to the environment under the prevailing pressure, temperature and salinity (Yender, 2009).

Commented [R34]: See previous comment about lead in comment about NOAA

Implementability: There are no implementability issues with this alternative as the technical know-how and equipment to conduct the above activities are readily available, and the scuttling technology has a well-established track record. Off-site treatment and disposal facilities are available and there are no impacts to any adjoining properties. There are no administrative issues since U.S. EPA and the U.S. Coast Guard have approved the need for this EE/CA and subsequent removal action. (or use the Section 3.2.1 language)

Cost: The total cost of this alternative is $2,000,000. No O&M cost will be incurred since the balance of what is not disposed of a permitted facility will be sunk at the bottom floor of the ocean.

Commented [ETL35]: This cannot be accurate.

3.2.3 Upland Disposal Greater Portland Area

Commented [ETL36]: Why limited to Portland? If there is a reason, so state.

This removal action alternative includes the following actions:

- Pre-removal structural assessment and inspection
- Removal and treatment of approximately 500,000 gallons of non-oily water

Commented [ETL37]: What happened to 2500 gasllons of oily water?

After the above removal actions are completed the vessel will prepared for transport and dry docking, including:

- Securing equipment on-board the vessel
- Preparation of deck and superstructure
- Preparation of below deck
- Preparation of hull

The vessel will be then towed using ~~three~~ tugs to a dry dock located at -description/setting. At the dry dock the following activities will be completed:

- Removal and disposal of approximately linear …. feet of electrical wiring

- Removal and disposal approximately 2,000 pounds of solid/hazardous waste
- Removal and disposal of lead-based paint from an area measuring approximately 500,00 square feet (ft^2)
- Removal and disposal of PCB paint from an area measuring approximately 12,000 ft^2
- Removal and disposal of approximately 1,000,000 pounds of foam

The solid/hazardous wastes removed will be disposed off-site at a permitted treatment, storage and disposal (TSD) facility in accordance with state and federal laws. Lead-based paint and PCB paint removal would generate wastewater from cleaning painted surfaces, wet abrasive blasting, or decontamination of personnel and equipment. Regardless of the source wastewater containing lead and PCB or paint solids will be collected in containers for proper treatment and discharge on location or treatment/disposal at a permitted TSD facility to avoid polluting surface water. After the removal is completed, confirmation sampling will be conducted to ensure that solid/hazardous materials have been satisfactorily removed (performance standards) Following EPA approval of the confirmation sampling results, the vessel will be dismantled. The superstructure and any other recyclable materials will be segregated from non-recyclable solid wastes for recycling/disposal. It is anticipated that approximately 2,400 tons of steel/metal will be recycled.

Effectiveness: This alternative will permanently remove the source of contamination from the current location, ~~and~~ eliminate potential exposure routes, and ~~is~~ protect~~ive~~ ~~of~~ public health, the environment, and the community. Short-term, there is a potential exposure to the workers preparing the vessel for dismantling. However, this can be minimized by use of engineering controls and appropriate personal protective equipment. All of the solid/hazardous materials will disposed off-site at a permitted TSD facility. Residual contamination may remain in place in the water column and sediment, but is not expected to pose long-term threat to human health and the environment. Contaminants may be introduced at the dry dock but proper engineering controls and best management practices will be used to prevent this from occurring.

From the standpoint of green remediation principles, this alternative would be effective at reducing the carbon footprint through recycling the scrap steel/metal comprising the vessel, and produce economic benefit at the steel/metal end of life cycle.

Implementability: There are no implementability issues with this alternative as the technical know-how and equipment to conduct the above activities are readily available. Off-site treatment and disposal facilities are available and there are no impacts to any adjoining properties. There are no administrative issues since U.S. EPA and the U.S. Coast Guard have approved the need for this EE/CA and subsequent removal action.

Commented [ETL38]: Not sure this is true?

Commented [ETL39]: Delete this sentence. By way of process, arguably USCG will announce for public comment and EPA will provide comments. In the end, USCG will decide. More, don't forget the AOC. Under this alternative and others, the vessel is way off the reservation and some sort of permit(s) may very well be required.

Cost: The total cost of this alternative is $2,000,000. No O&M cost will be incurred since the balance of what is not disposed of a permitted facility will be sunk at the bottom floor of the ocean.

4.0 Comparative Analysis of Removal Action Alternatives

References:

PEO Ships. 2006. Ex-ORISKANY Artificial Reef Project, Ecological Risk Assessment. Final Report. January 2006.

U.S. Navy. 2006. Investigation of PCB Release-Rates from Selected Shipboard Solid Materials Under Laboratory-Simulated Shallow Ocean (Artificial Reef) Environments. Technical Report 1936. April 2006.

U.S. Navy. Fact Sheet. Accessed on February 22, 2011 http://www.navsea.navy.mil/teamships/Inactiveships/Artificial_Reefing/factsheets/ex-ORISKANY_Fact_sheet.pdf)